

The claimed invention is:

1. A system for bi-directional communication within a power distribution system, the system configured to find an endpoint, the endpoint having an endpoint transceiver in electrical communication with a power distribution line, the power distribution line being within the power distribution system, the endpoint being identified by a unique I.D., the system comprising:

a substation transceiver electrically coupled to a power distribution line within the power distribution system;

a substation circuit in electrical communication with the substation transceiver, the substation circuit programmed to map the unique I.D. for the endpoint to a base frequency within a bandwidth and to control the endpoint to transmit a find endpoint data packet onto the power distribution network, the find endpoint data packet including the unique I.D. and the base frequency, and to assign a status to the base frequency upon receiving a signal from the endpoint, the status indicating that the substation transceiver is receiving signals in the frequency bandwidth.

2. The system of claim 1 wherein the substation circuit is further programmed to:

determine whether the substation transceiver stopped receiving a signal within the bandwidth corresponding to the base frequency assigned to the endpoint transceiver; and

control the substation transceiver to retransmit the find endpoint data packet containing the unique I.D. of the endpoint and the base frequency assigned to the endpoint transceiver.

3. The system of claim 1 wherein the substation circuit is further programmed to control the substation transceiver to repeatedly transmit the find endpoint data packet in a predetermined interval until the substation transceiver receives a signal from the endpoint identified by the unique I.D.
- 5 4. The system of claim 3 wherein the predetermined interval is about 1 minute.
- 5 5. The system of claim 3 wherein the substation circuit is further programmed to control the substation transceiver to repeatedly transmit the find endpoint data packet in a predetermined interval, the repeated transmission of the data packet being interrupted only by the prescheduled transmission of an alternative data packet.
- 10 6. The system of claim 2 wherein the substation transceiver and substation circuit are located at a first power distribution substation, the system further comprising:
 - a second substation transceiver and a second substation circuit, the second substation transceiver being in electrical communication with the second substation circuit, the second substation transceiver and the second substation circuit being located at a second power distribution substation;
 - 15 and
 - a control server in data communication with the substation circuit at the first power distribution substation and the substation circuit at the second power distribution substation;
- 20 wherein, upon a loss of communication between the endpoint and the substation transceiver at the first power distribution substation, the control server instructs the substation circuit at the second substation to map the unique I.D. identifying the endpoint to a base frequency within a bandwidth and to

control the substation transceiver at the second power distribution
substation to transmit a find endpoint data packet over the power
distribution system, the data packet including the unique I.D. for the
endpoint and the base frequency, and to assign a status to the base frequency
upon receiving a signal from the endpoint, the status indicating that the
substation transceiver located at the second power distribution substation is
receiving signals in the bandwidth corresponding to the base frequency.

7. A computer data signal embodied in a carrier wave readable by a programmable circuit
and encoding a data packet, the data packet comprising:

10 a character string identifying a unique endpoint, the endpoint including an endpoint

transceiver in electrical communication with a power distribution line
within a power distribution system, an endpoint circuit in electrical
communication with the endpoint transceiver, and an automated meter
reading device in electrical communication with the endpoint circuit;

15 a base frequency corresponding to a bandwidth over which the endpoint transceiver

will transmit a signal upon receipt and processing of the data packet; and

a find command instructing the endpoint transceiver to transmit a signal over the
bandwidth corresponding to the base frequency;

wherein the carrier wave is transmitted over a power distribution line within the

20 power distribution system.